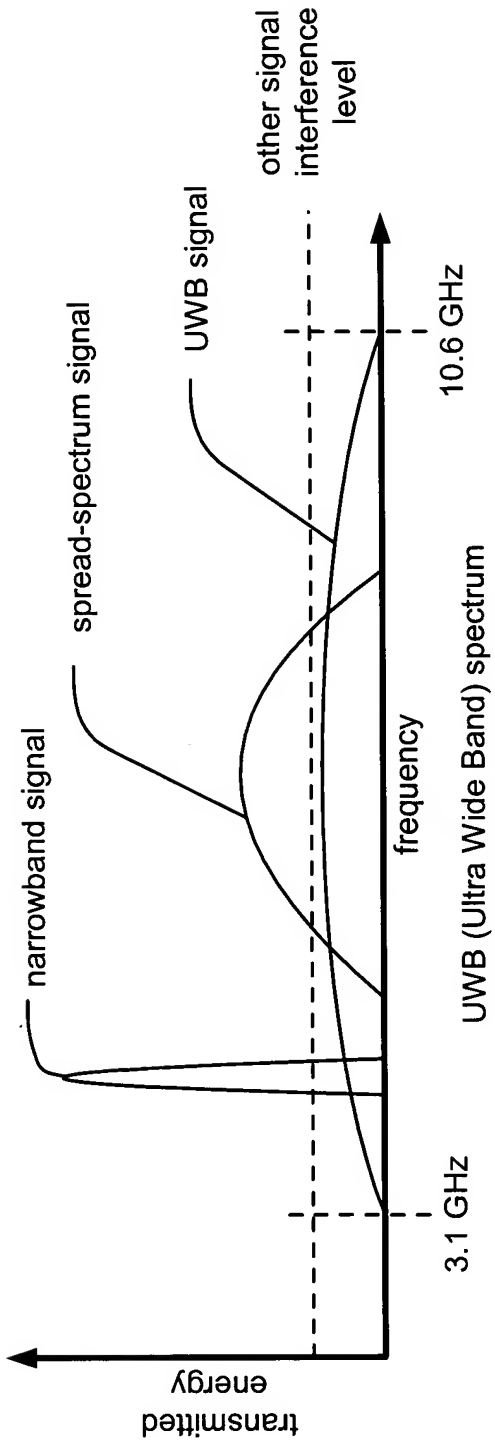

transmitted energy
narrowband signal
spread-spectrum signal
UWB signal
other signal interference level
3.1 GHz
10.6 GHz
frequency
UWB (Ultra Wide Band) spectrum

Fig. 1A

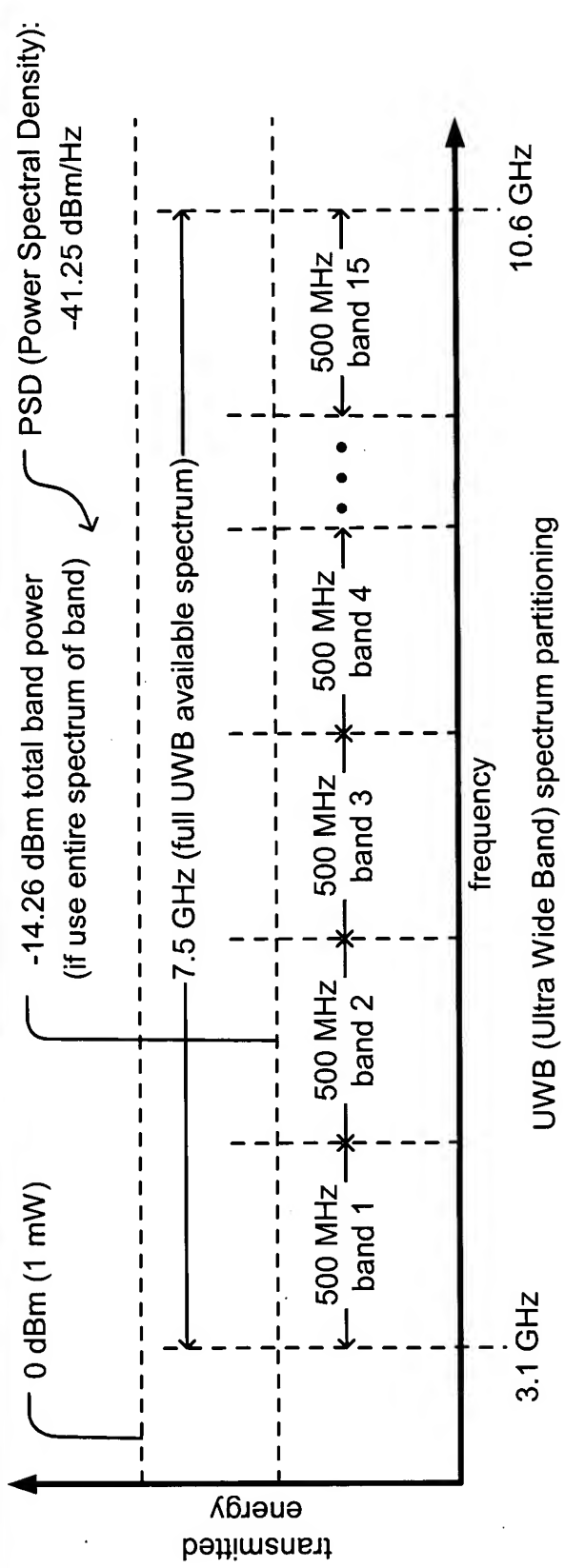
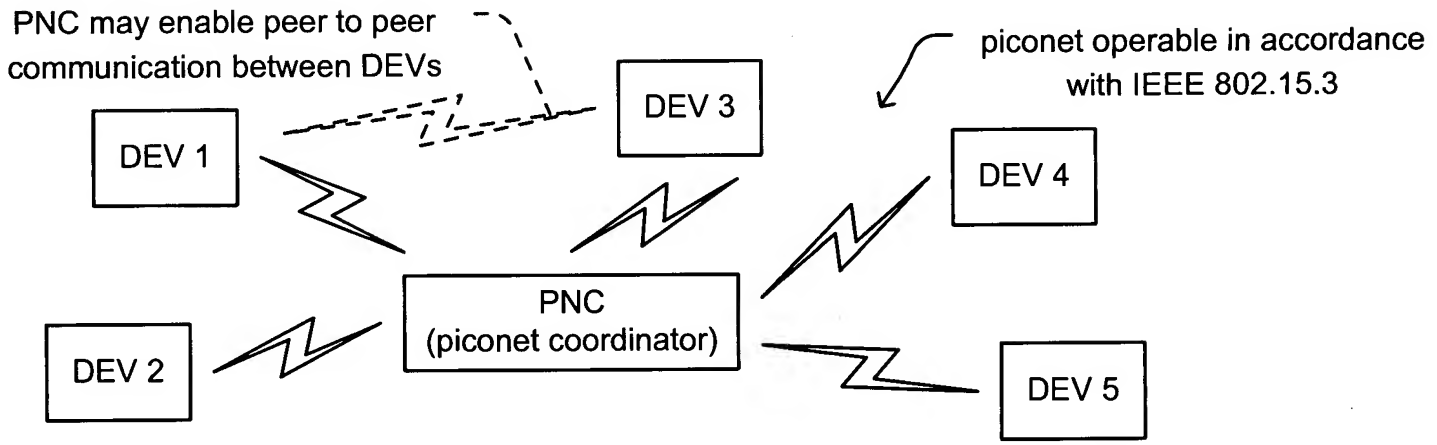
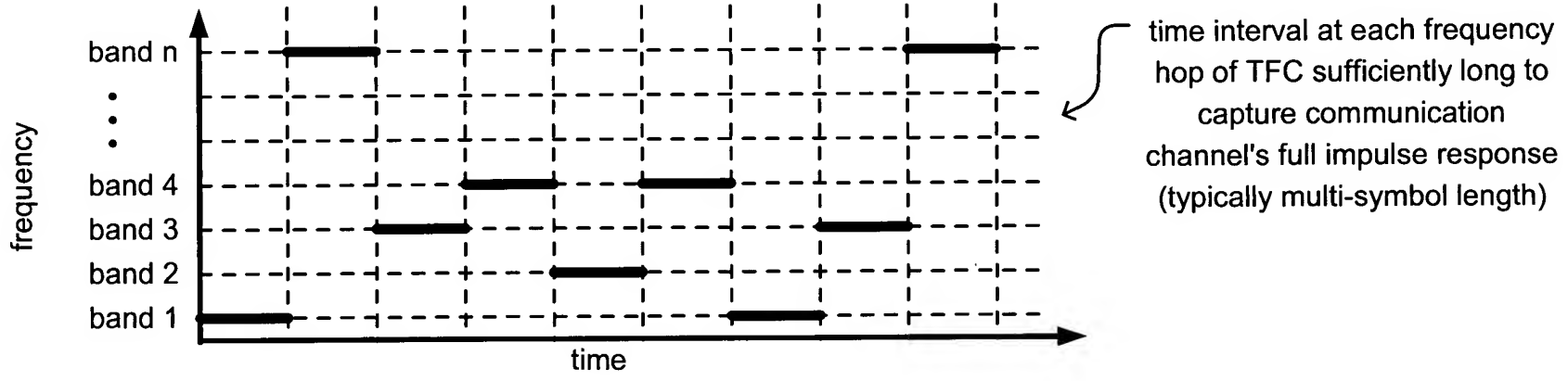

transmitted energy
0 dBm (1 mW)
-14.26 dBm total band power (if use entire spectrum of band)
PSD (Power Spectral Density): -41.25 dBm/Hz
7.5 GHz (full UWB available spectrum)
500 MHz band 1
500 MHz band 2
500 MHz band 3
500 MHz band 4
500 MHz band 15
3.1 GHz
10.6 GHz
frequency
UWB (Ultra Wide Band) spectrum partitioning

Fig. 1B



piconet (shown in wireless communication system embodiment)

Fig. 2A



TFC (time frequency code) (having period)

Fig. 2B

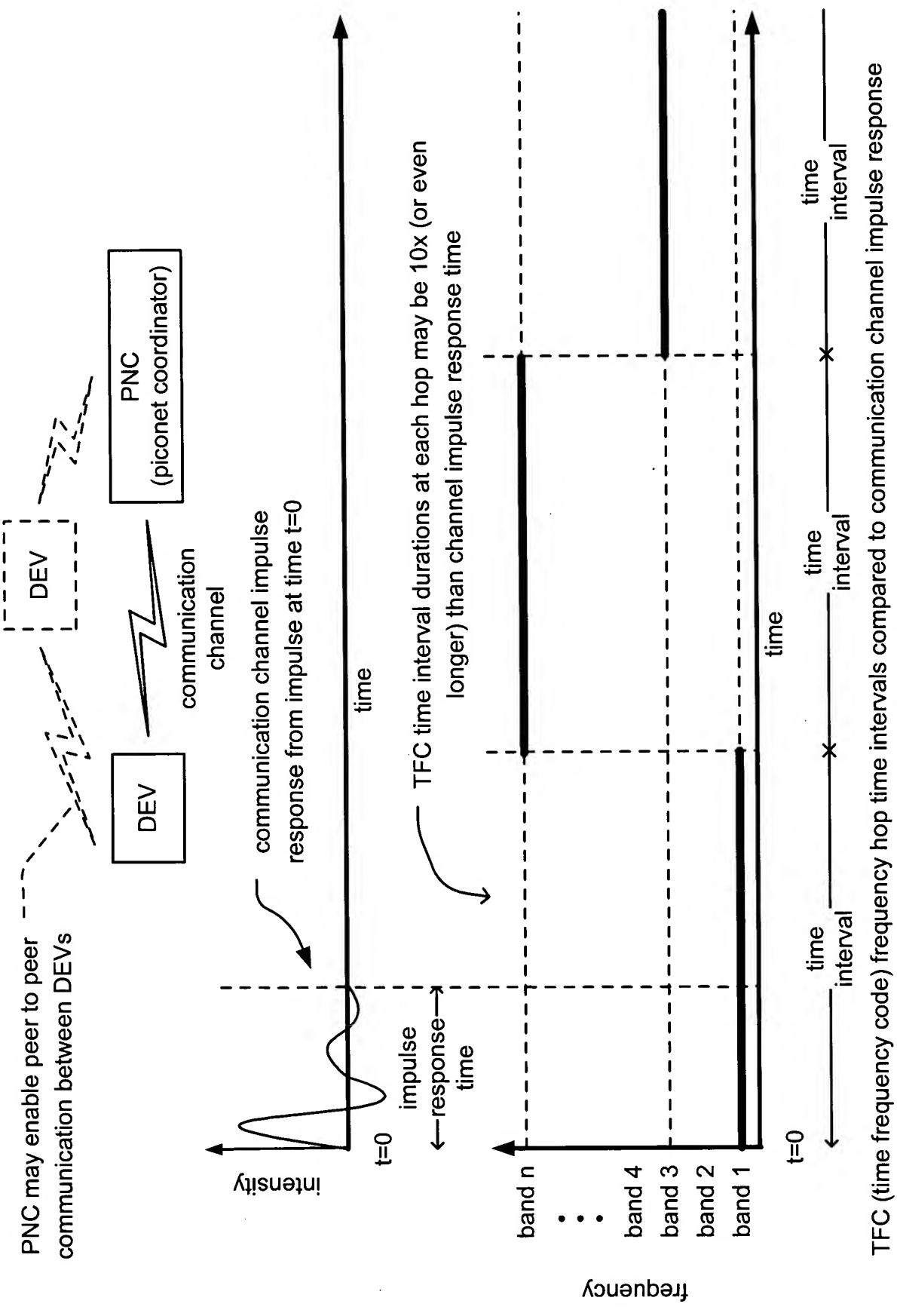

PNC may enable peer to peer communication between DEVs
DEV
DEV
communication channel
PNC (piconet coordinator)
communication channel impulse response from impulse at time t=0
time
intensity
t=0
impulse response time
TFC time interval durations at each hop may be 10x (or even longer) than channel impulse response time
band n
band 4
band 3
band 2
band 1
frequency
time
time interval
time
time interval
time
time interval
t=0
TFC (time frequency code) frequency hop time intervals compared to communication channel impulse response

Fig. 3

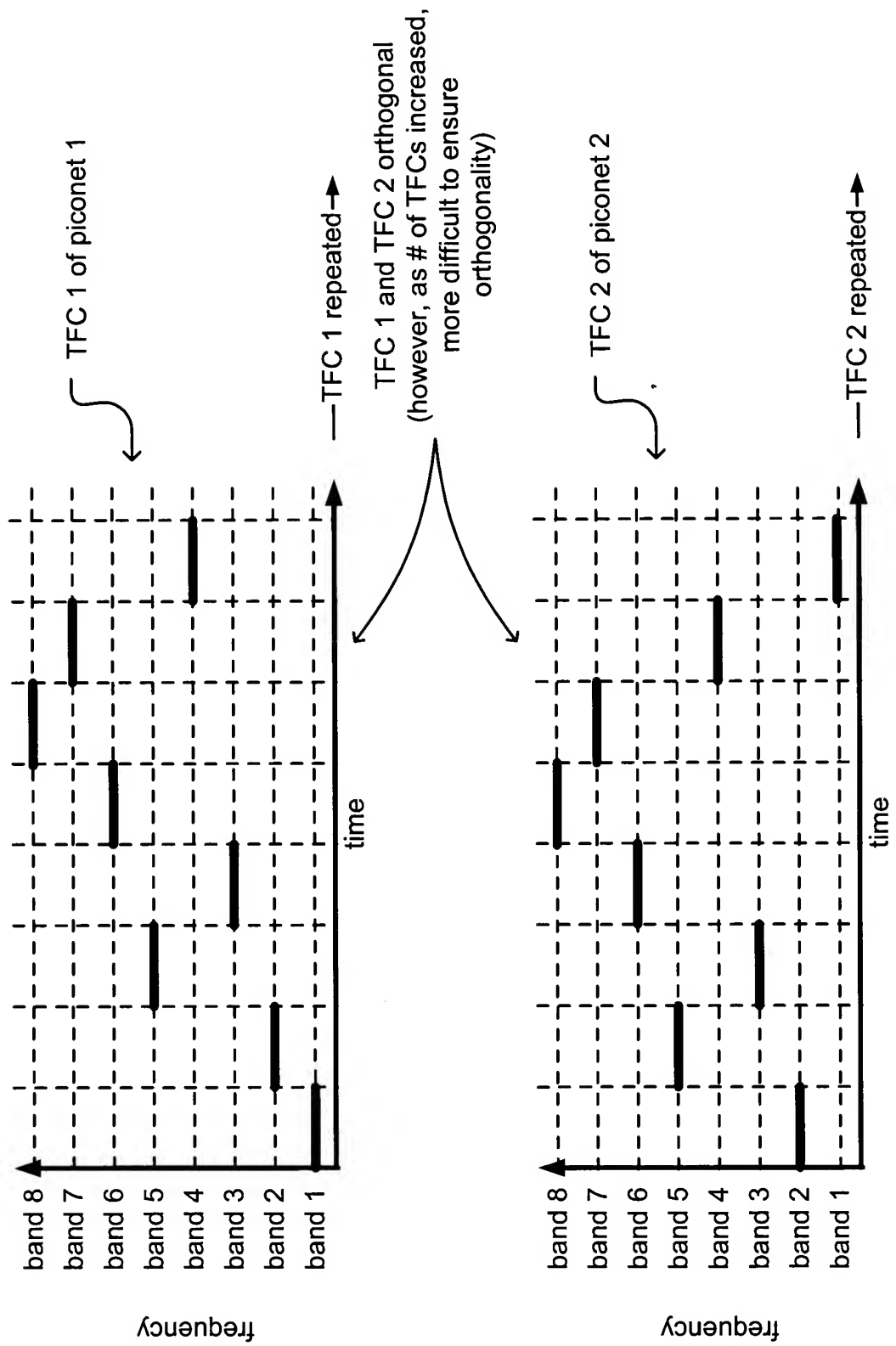
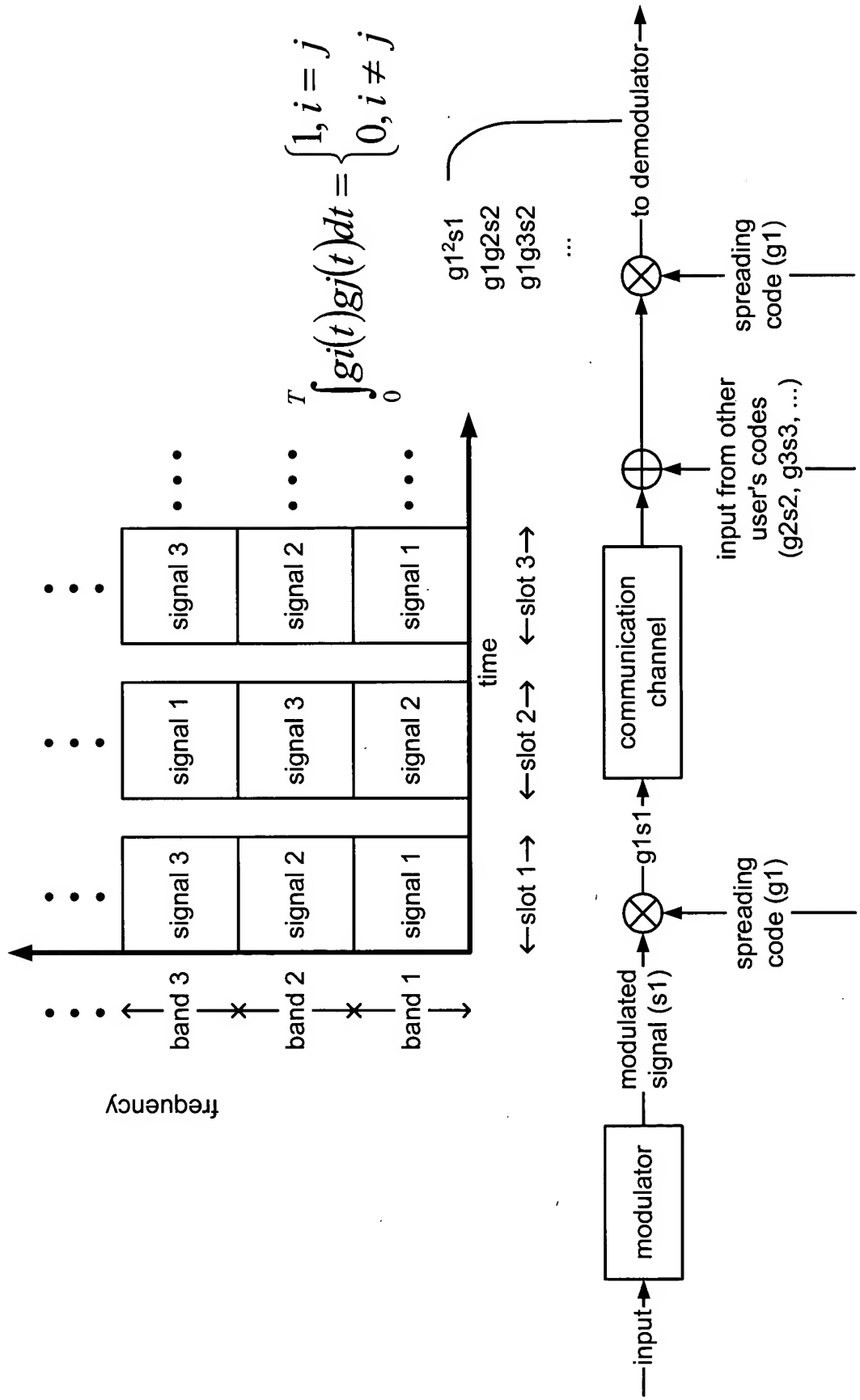
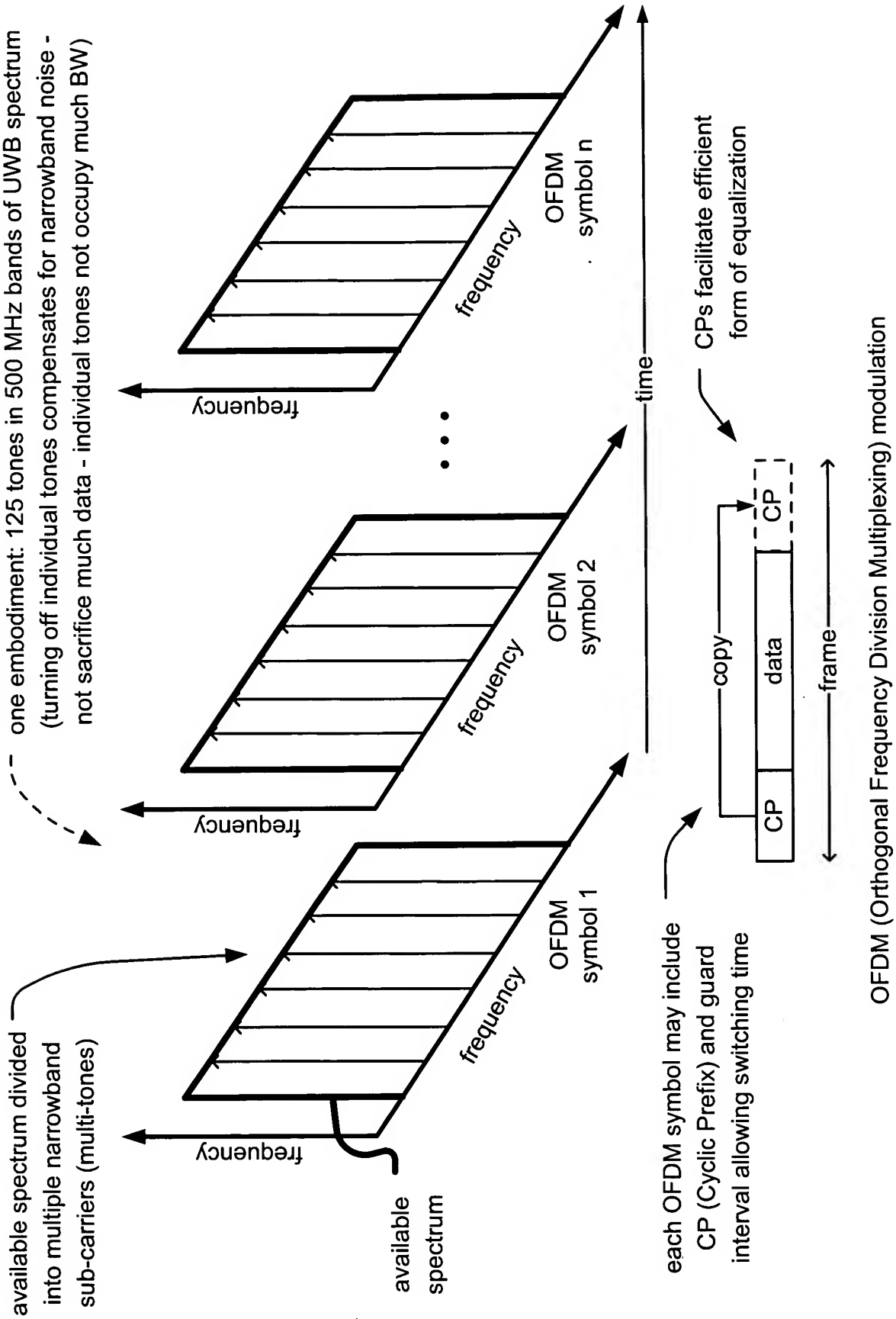

TFC 1 of piconet 1
TFC 1 repeated
TFC 1 and TFC 2 orthogonal (however, as # of TFCs increased, more difficult to ensure orthogonality)
TFC 2 of piconet 2
TFC 2 repeated
band 8
band 7
band 6
band 5
band 4
band 3
band 2
band 1
frequency
time
TFC (time frequency code)

Fig. 4



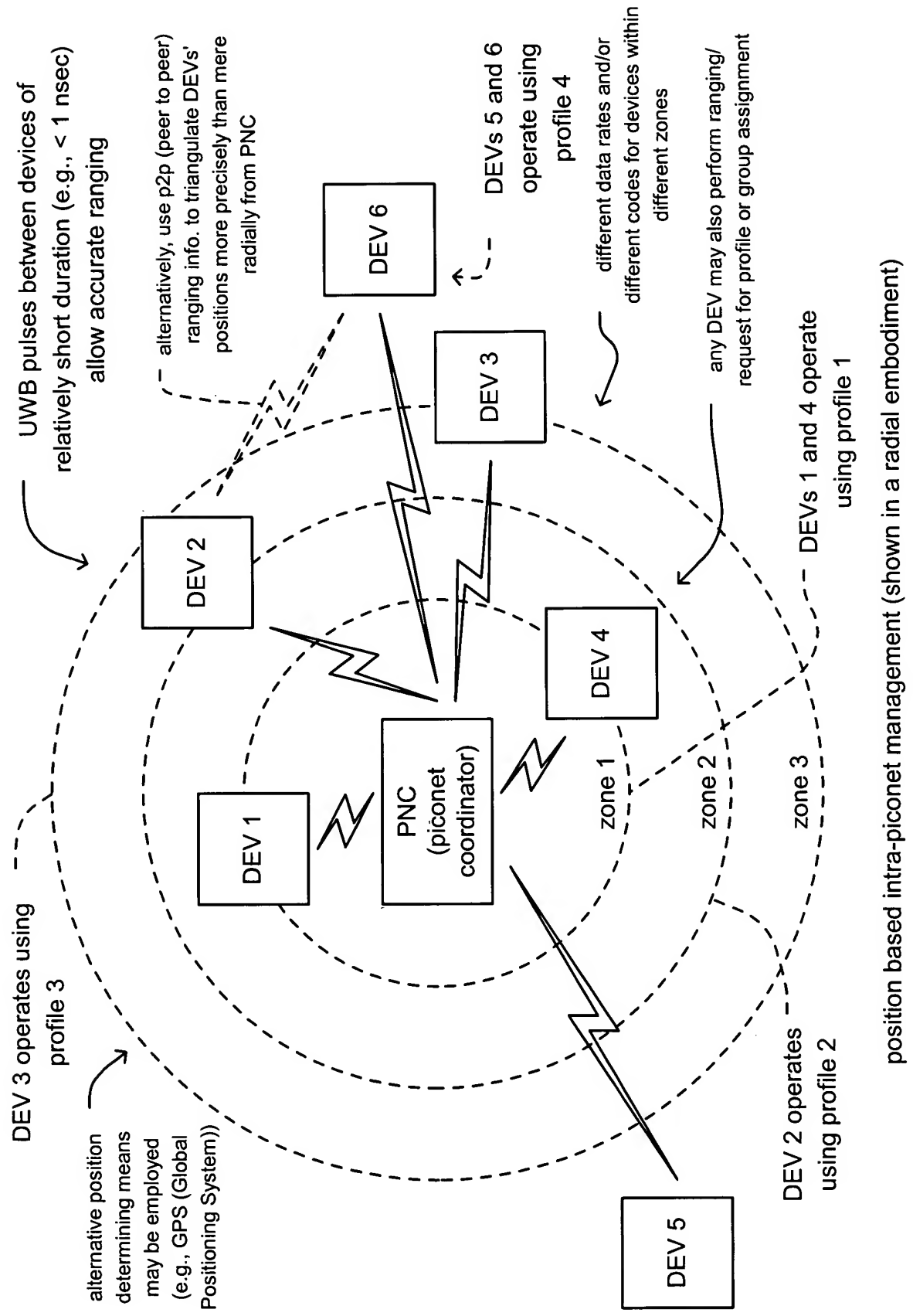
CDMA (Code Division Multiple Access)

Fig. 5



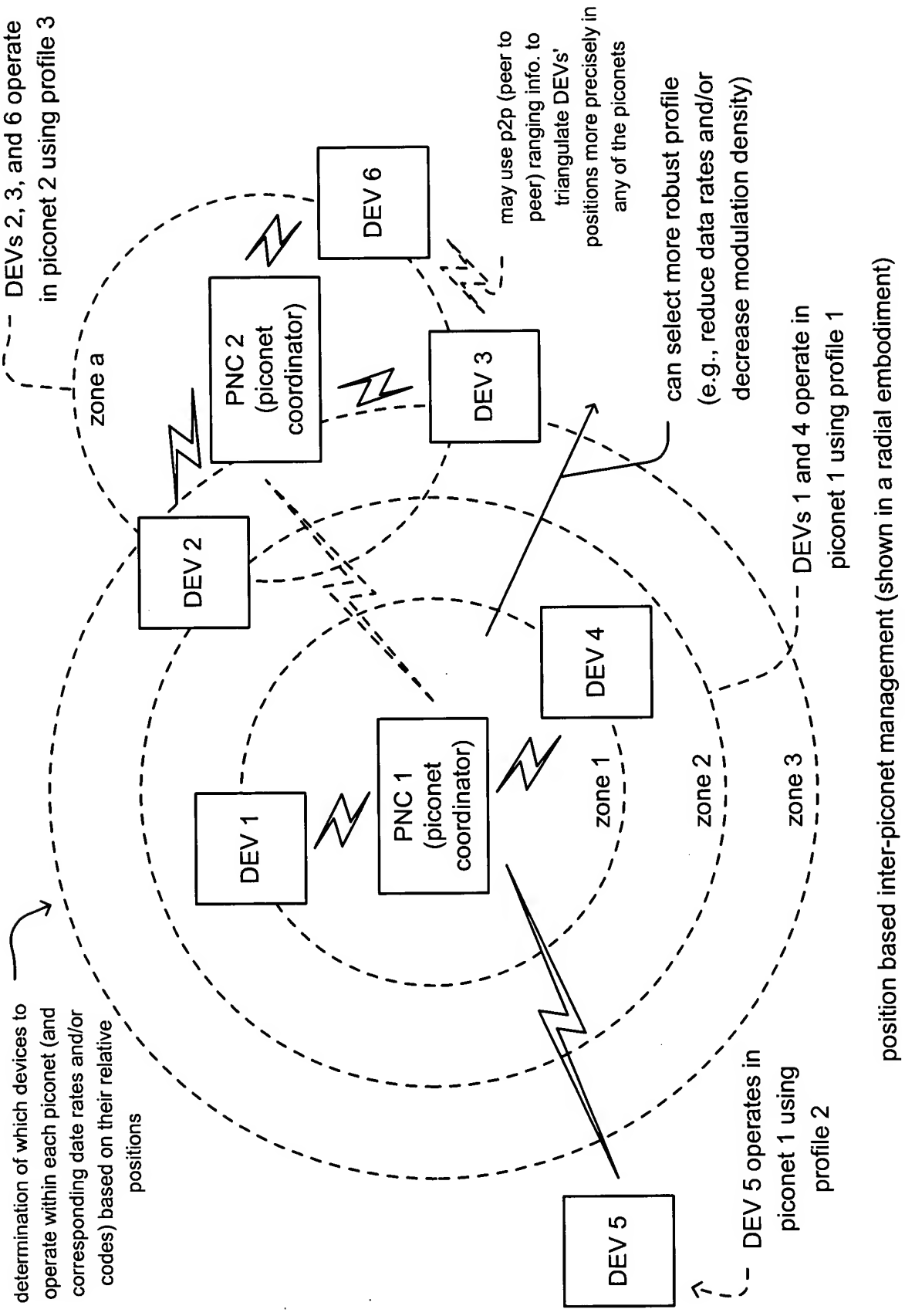
OFDM (Orthogonal Frequency Division Multiplexing) modulation

Fig. 6



position based intra-piconet management (shown in a radial embodiment)

Fig. 7



position based inter-piconet management (shown in a radial embodiment)

Fig. 8

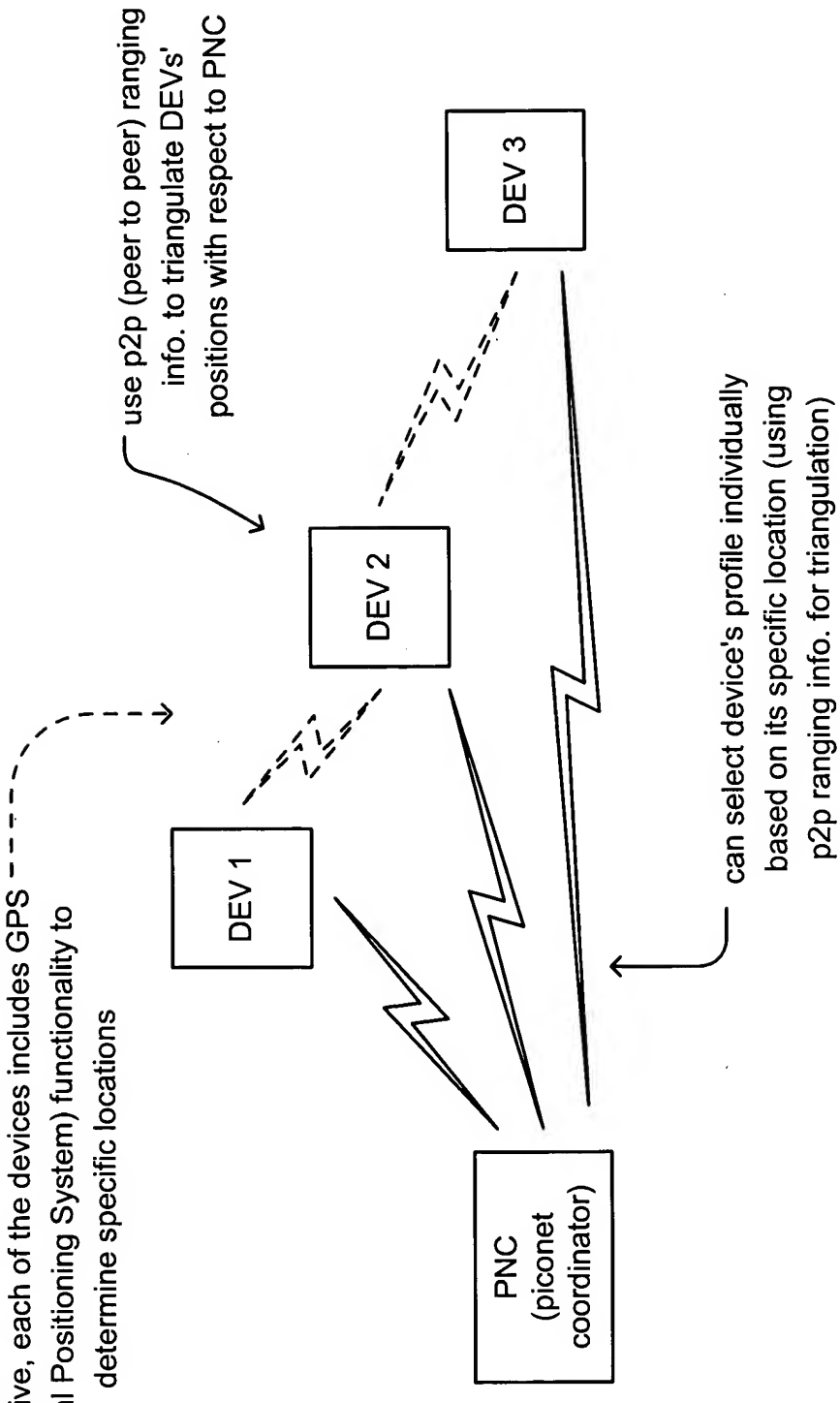
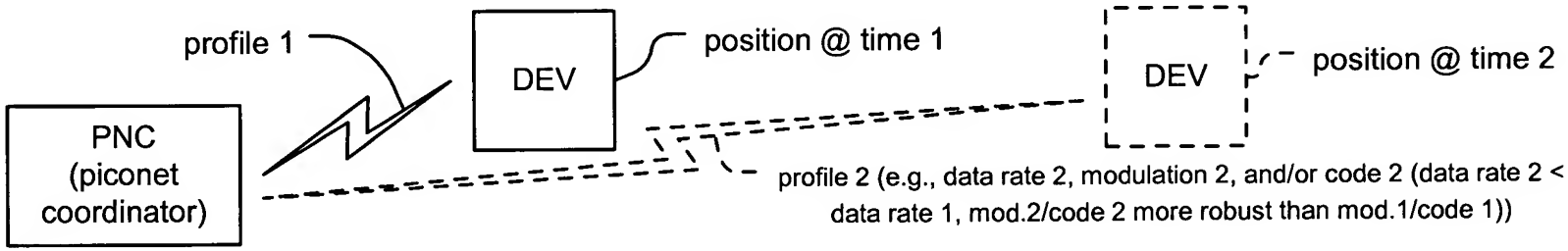


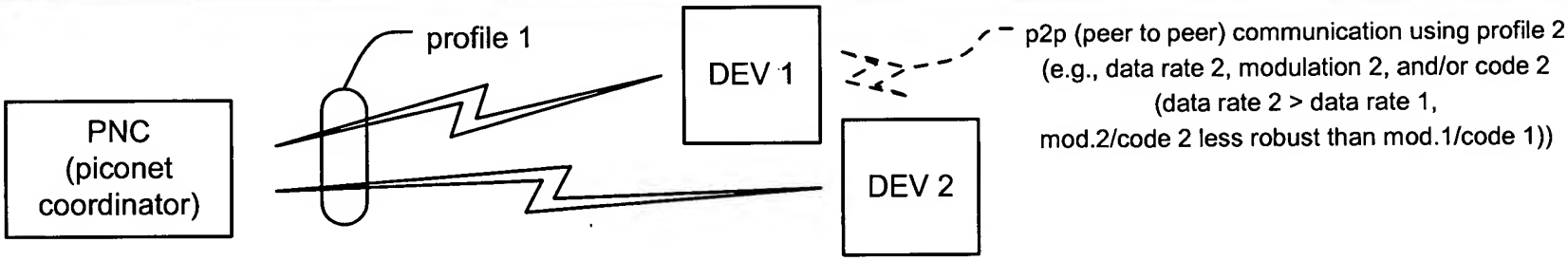
Fig. 9

position based intra-piconet management (shown using triangulation)



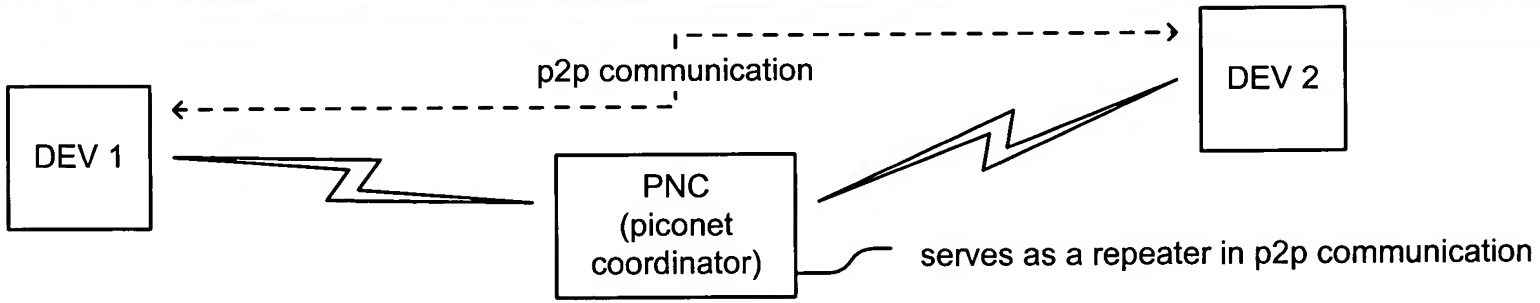
profile modification based on change in relative positions

Fig. 10A



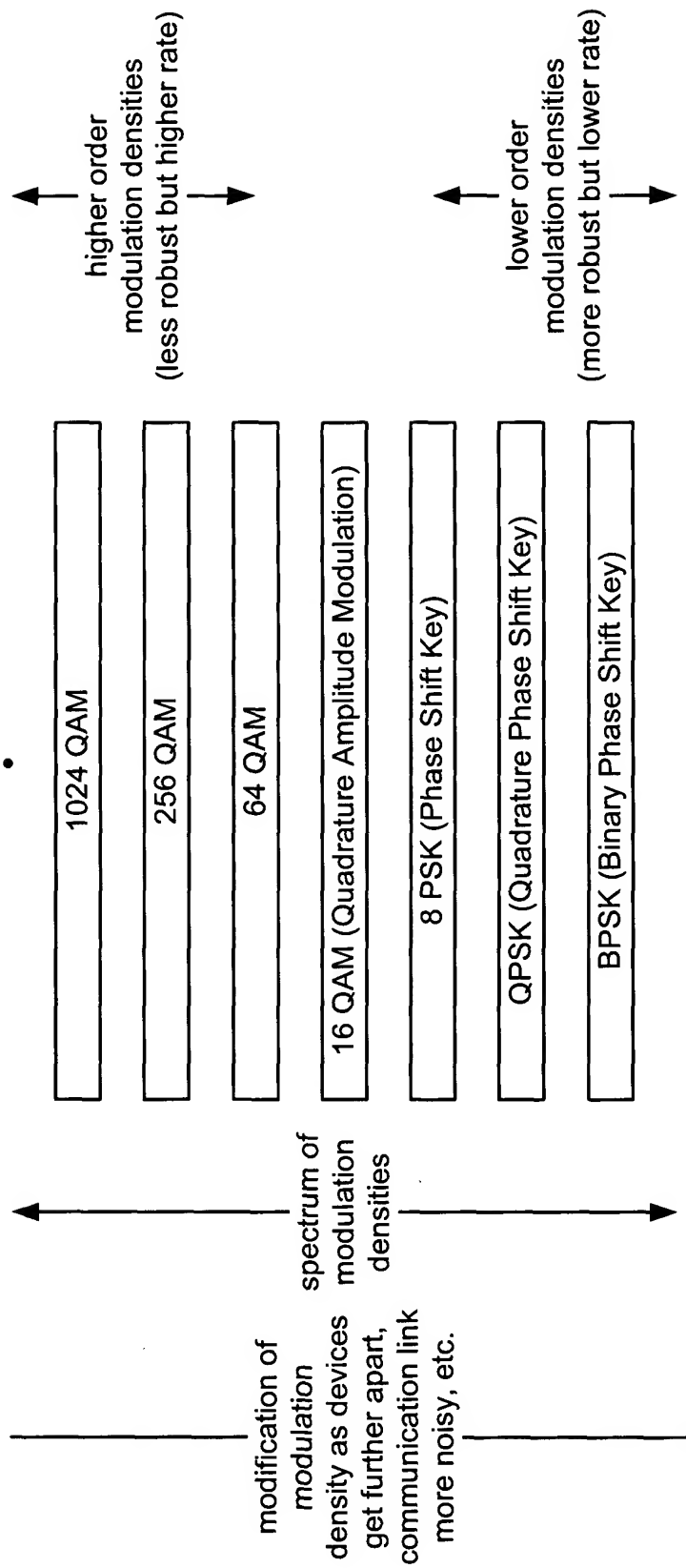
PNC sets up p2p (peer to peer) communication based on relative positions of DEVs

Fig. 10B



position based intra-piconet management

Fig. 10C



example modulation density modification based on position of devices

Fig. 11

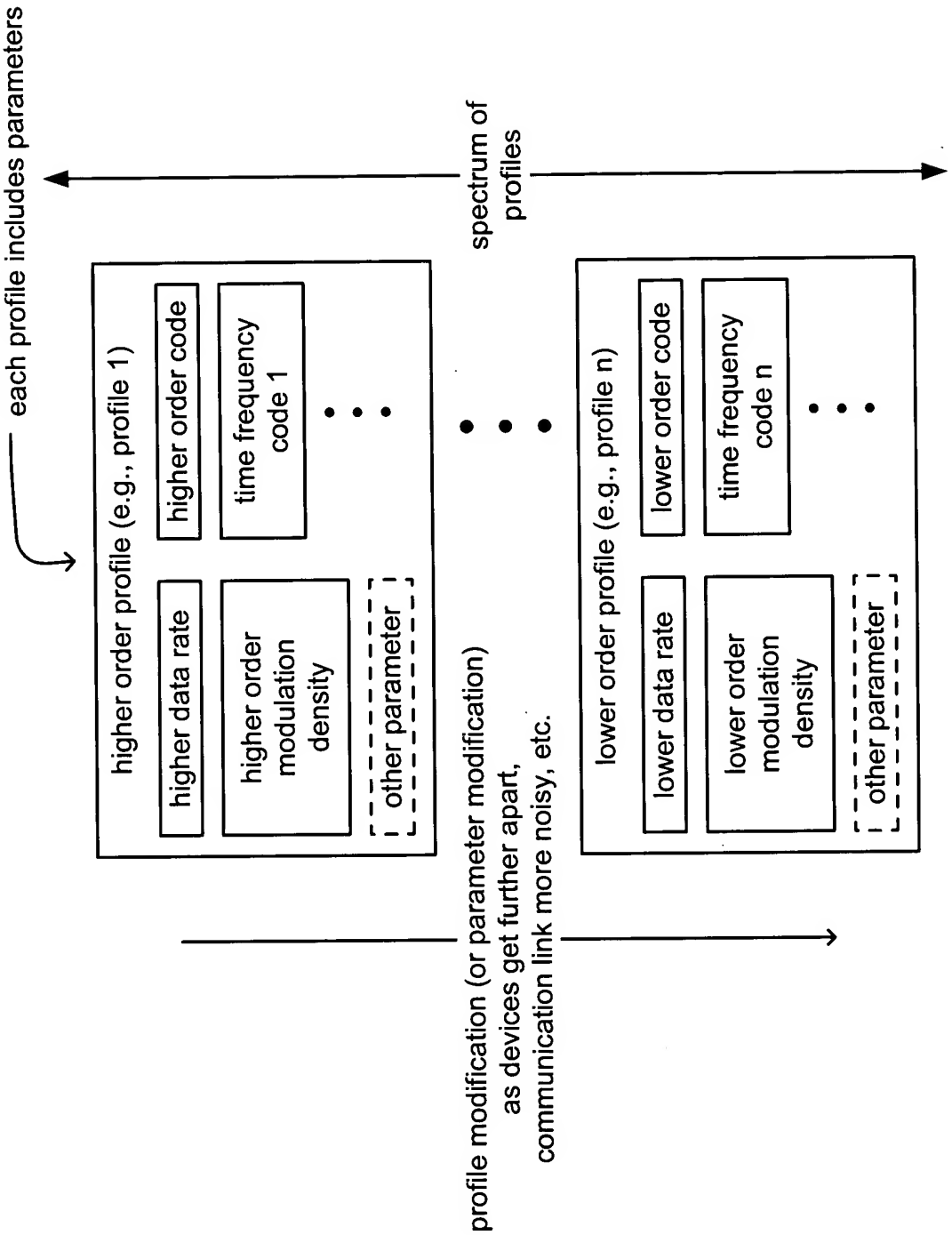


Fig. 12

example profile modification (or parameter modification) based on position of devices

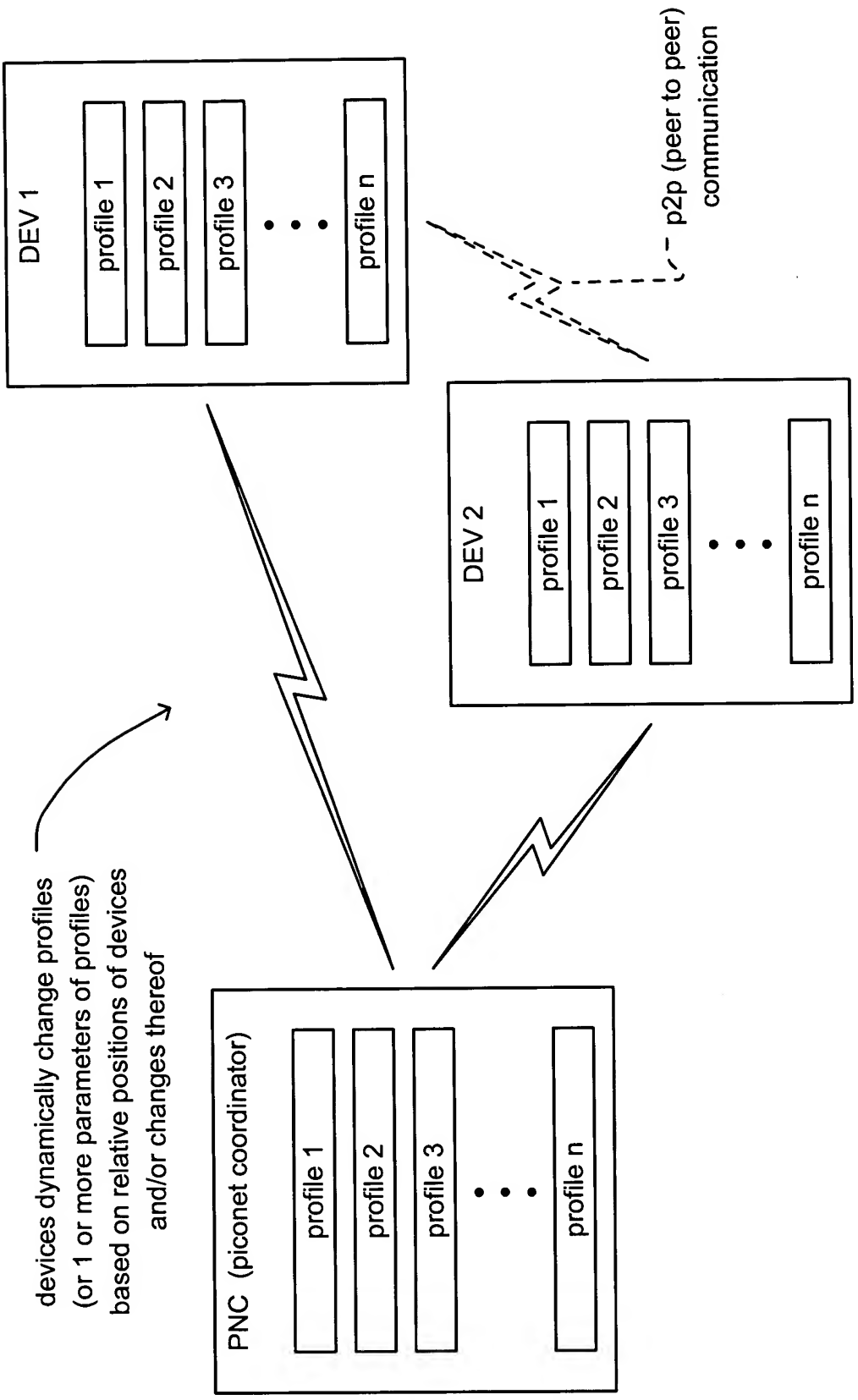
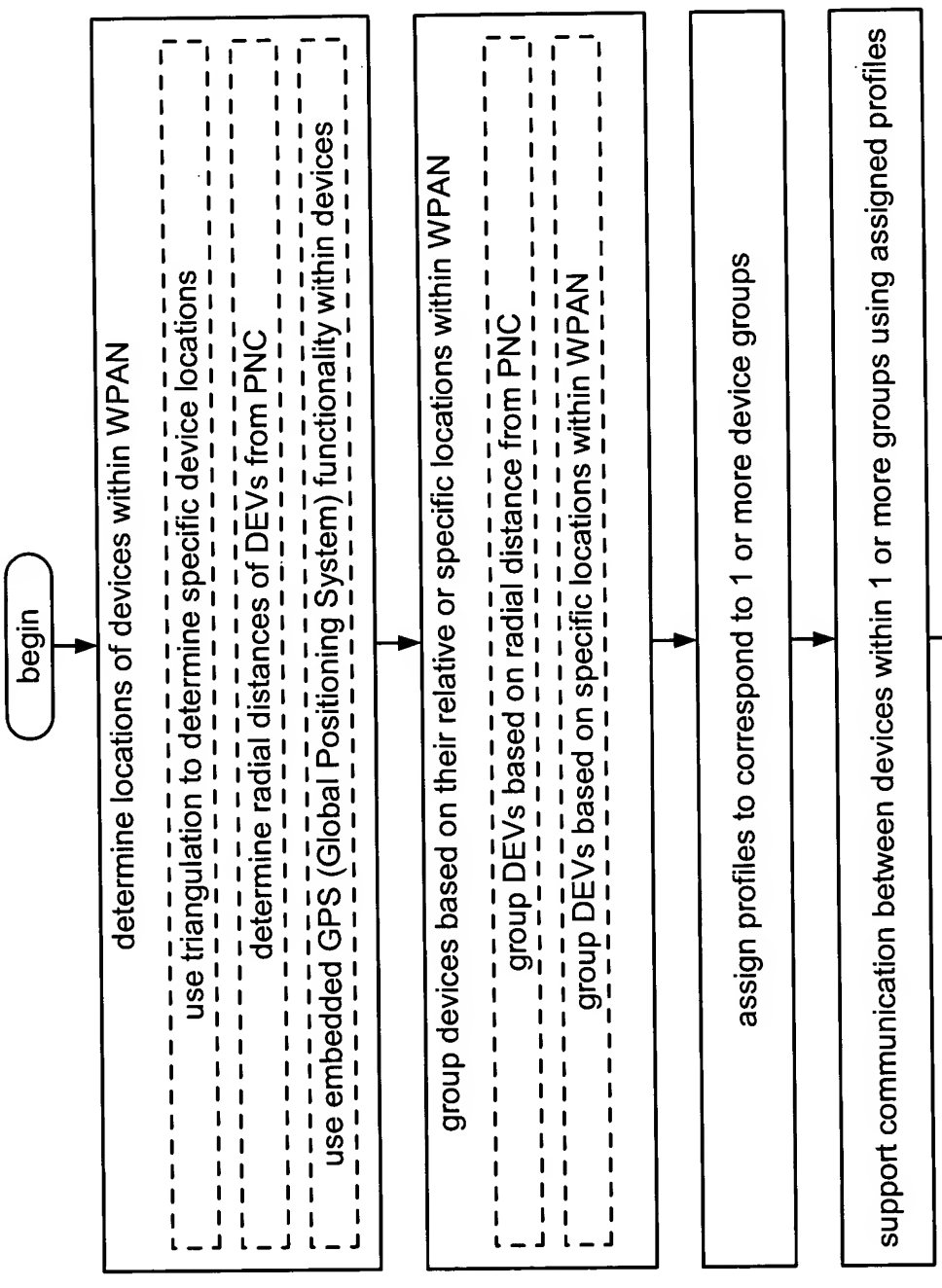
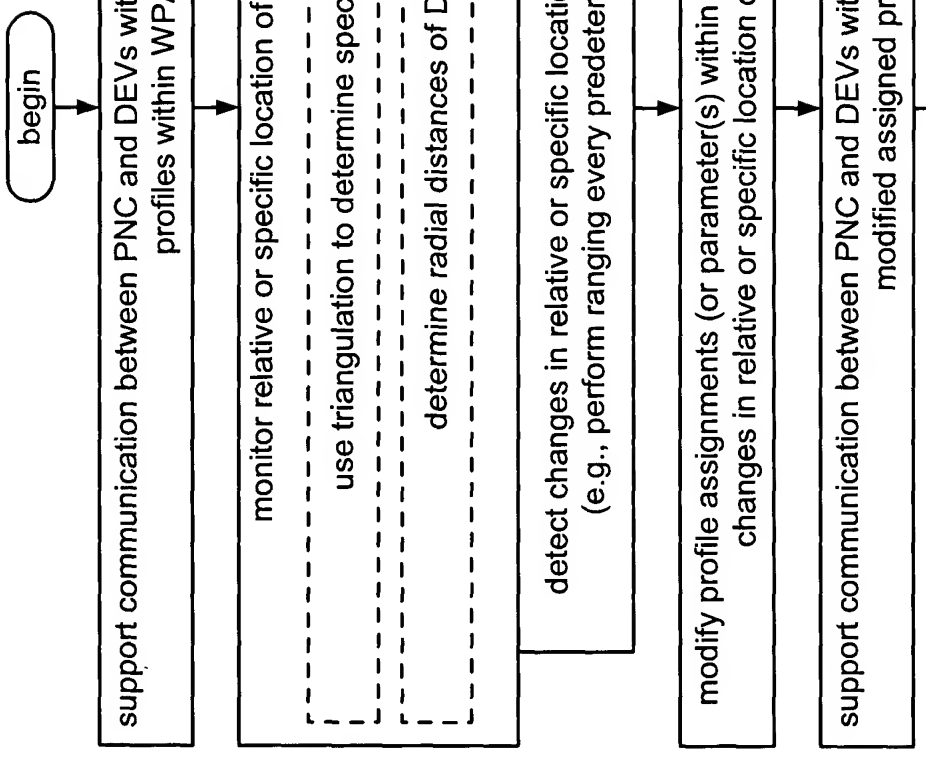

DEV 1
profile 1
profile 2
profile 3
profile n
p2p (peer to peer) communication
DEV 2
profile 1
profile 2
profile 3
profile n
PNC (piconet coordinator)
profile 1
profile 2
profile 3
profile n
devices dynamically change profiles (or 1 or more parameters of profiles) based on relative positions of devices and/or changes thereof
predetermined, finite set of profiles (and corresponding parameters) stored within devices

Fig. 13



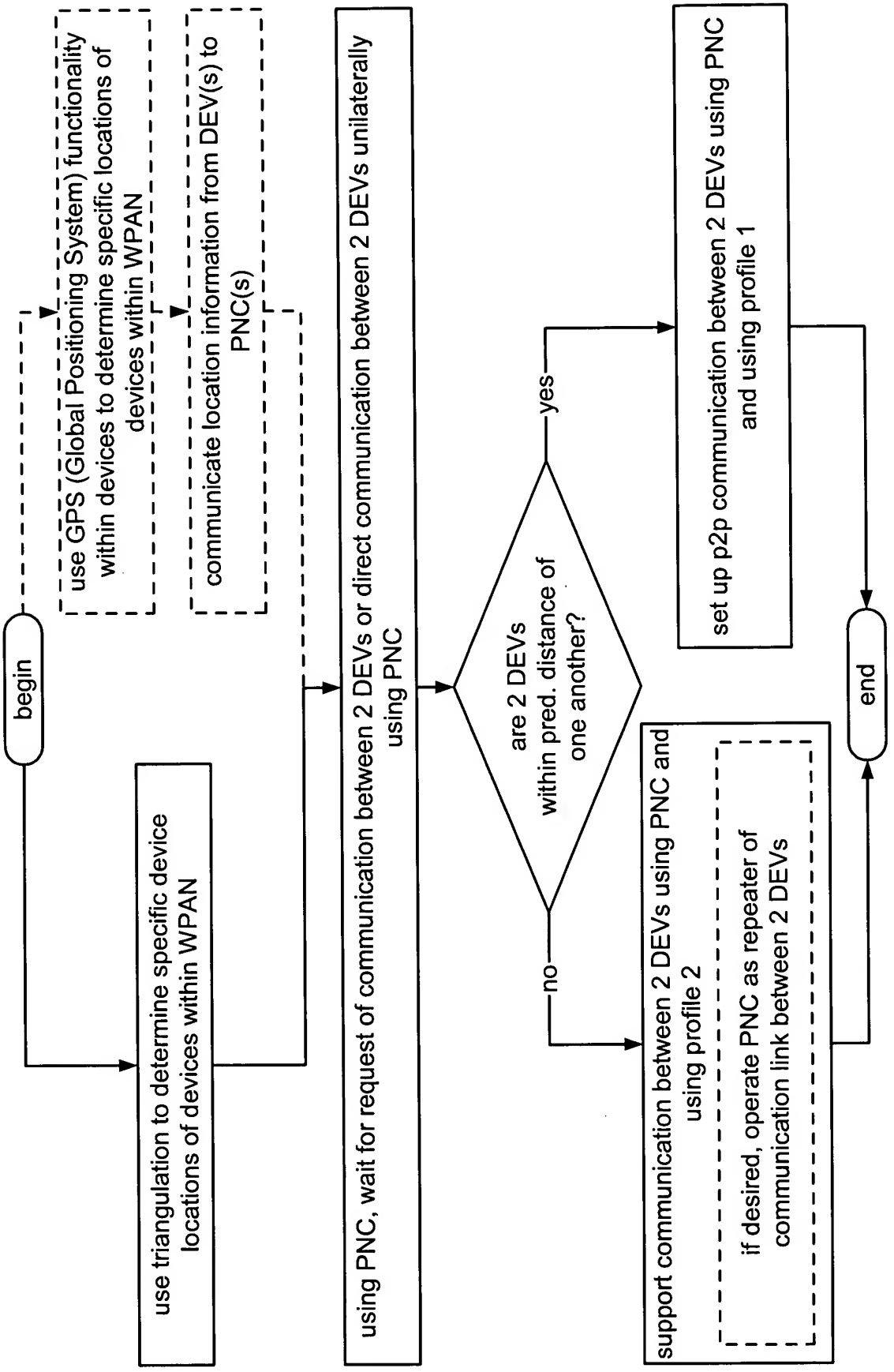
WPAN (Wireless Personal Area Network) management method

Fig. 14



WPAN (Wireless Personal Area Network) management method

Fig. 15



WPAN (Wireless Personal Area Network) management method

Fig. 16